United States Environmental Protection Agency
Region 5
Air and Radiation Division
77 West Jackson Boulevard
Chicago, IL 60604

DATE: AUG 11 2011

SUBJECT: Inspection of Green Plains Otter Tail LLC
Fergus Falls, Minnesota

FROM: Molly DeSalle, Environmental Scientist MJD
Air Enforcement and Compliance Assurance Section (MI/WI)

THRU: Sara Breneman, Chief SB
Air Enforcement and Compliance Assurance Section (MI/WI)

TO: File

Facility:	Green Plains Otter Tail LLC
Location:	24096-170th Avenue, Fergus Falls, Minnesota
Inspection Date:	July 15, 2011
Inspection Team:	Molly DeSalle, Environmental Scientist, EPA Region 5 Greg Gehrig, Environmental Engineer, EPA Region 5
Facility Attendees:	Anthony Hicks, General Manager, Green Plains Otter Tail LLC Janet Aultman, Environmental, Health, Safety & Security Manager, Green Plains Otter Tail LLC Keith Wetzel, Plant Manager, Green Plains Otter Tail LLC

Purpose of the Inspection:

To investigate, inspect, and determine whether Green Plains Otter Tail LLC (Green Plains) is in compliance with the Minnesota State Implementation Plan (SIP) and the Federal Clean Air Act (CAA). This includes interviewing Green Plains' personnel, a facility tour and limited on-site records review.

Overview of Company:

Green Plains is an ethanol production facility located in Fergus Falls, Minnesota (the facility). The facility currently produces 55 million gallons of ethanol per year (mmgy). Also, the facility

processes 385,000 bushels of grain a week, with a storage capacity on site which hold a 10-day grain processing supply.

The facility started-up in May 2008, after 18 months of construction. The facility is a Delta-T designed plant and was originally owned by 900 local investors under the name Otter Tail Ag Enterprise. The Enterprise went bankrupt in 2010, but the bankruptcy judge allowed the plant to stay operating. Green Plains Renewable Energy, Inc. purchased the facility and is the current owner.

Approximately 50 people are employed at the facility and operations run 24 hour per day, 7 days per week.

The main products from the facility are fuel grade 200-proof ethanol, wet distillers grain (WDG), and dry distillers grain with solubles (DDGS).

Opening Conference:

Greg Gehrig and I arrived at Buffalo Lake at 8:00 am on July, 15, 2011. We were greeted by Anthony Hicks, the facility's General Manager. After presenting our credentials, we were led to a conference room to explain the purpose of our visit.

The opening conference began around 8:30 am, after various Green Plains employees joined the discussion (listed above under the facility attendees heading). During the opening conference, we stated this was an unannounced inspection lead by the Environmental Protection Agency (EPA), and the Minnesota Pollution Control Agency (MPCA) had declined an invitation to participate. We also stated that questions would be asked about the facility's processes and a tour of certain units would be incorporated into the inspection. We requested a review of the facility's process so we could understand the ethanol manufacturing process. We learned the facility is solely a dry mill. We requested additional information about the specific dry mill process used by the facility.

We were informed the facility contracts Guardian to perform its leak detection and repair program (LDAR), as well as other environmental documentation.

Facility Operations:

The dry milling process grinds the entire kernel of corn into a flour/powder. The starch in the flour is converted to ethanol during a fermentation process, which creates carbon dioxide and distiller's grain.

The process begins when the grain arrives at the facility solely by truck; however the facility does have the capability of receiving grain via rail. Each truck's grain is probed for moisture content and general quality control parameters, to ensure the grain arriving at the facility is an adequate product.

Once the trucks are weighed at the scale house, trucks drive into a semi-enclosed building. The building has two lanes equipped for trucks to unload their grain onto the grated floor. The grain falls through the mesh grate and onto a receiving belt below which directs the corn, via a conveyor, to one of the facility's two 300,000 bushel storage silos. The entire grain load out process is controlled by one baghouse. The pressure readings and visible emission readings are recorded daily and entered into a database once a week.

From the silos, the corn kernels are transferred to the day silo, which is only a few thousand bushels. This silo is controlled by a baghouse and stores enough corn to be processed in one day. From the day silo the corn goes through a scalper and then to the facility's hammer mills.

Once the flour is generated, it is sent to a slurry tank where the following materials are added to the flour: the enzyme alpha-amylase, process condensate (warm water), thin stillage, and ammonia for pH control. The slurry is maintained at a temperature of 220 degrees Fahrenheit for 30 minutes. The slurry tank is vented to the vent gas scrubber and the facility maintains flow rates and pressure readings on the scrubber through daily logs.

The slurry is then routed to the facility's one liquefaction tank. The slurry spends two hours in the tank and is agitated the entire time. The tank is maintained at 185 degrees Fahrenheit. The emissions from the tank are vented to the facility's vent gas scrubber.

After leaving the liquefaction tank, the slurry is cooled to 90 degrees Fahrenheit in a heat exchanger in the main process building.

Once the mash is cooled, it is sent to one of the facility's four 700,000 gallon fermentation tanks. The mash ferments for 55-60 hours.

All fermenters dump to one 1 million gallon beer well. Each of the fermenters is vented to a common header, which is vented to a carbon dioxide (CO_2) scrubber. The facility does maintain records and information on the CO_2 scrubber, including sodium bisulfate addition rates, water flow rates, and scrubber unit pressure readings.

When the fermentation process is complete, the mash is sent through a series of three heat exchangers to heat up the material to 220 degrees Fahrenheit. The material is then transferred to the beer column in the distillation system.

The mash is heated to force a separation between water and ethanol, due to the difference in boiling points. The final products after the distillation cycle are 190-proof ethanol, which still contains a small portion of water, and the remaining mash.

The 190-proof ethanol is sent through a mole sieve distillation system to remove the remaining water from the ethanol solution because of the difference in size of each molecule. The result is 200-proof ethanol.

The final product, fuel grade ethanol, is sent to facility's final product one million gallon storage tank.

The stillage from the bottom of the distillation process contains a percentage of solids from the grain and yeast, as well as liquid from any water added during the process. This stillage is sent to the first effect evaporator, which vents to the vent gas scrubber, before it is sent to one of 4 centrifuges to remove water and collect the remaining solids. The centrifuges produce a thin stillage (liquid with a percentage of water) and WDG.

The facility sells WDG on a make-to-order basis, which averages out to three days a week. Before the WDG is dumped onto the wet pad for resale, syrup is added.

From the centrifuges, the stillage that is not sold as wet cake is sent to the one natural gas drum dryer. Syrup is added before the WDG enters the dryer.

After exiting the dryer the DDGS is sent through four cyclones to cool the material and separate the final product from the dryer air.

All dryer emissions are sent to the facility's regenerative thermal oxidizer (RTO). There are no continuous emission monitoring (CEMS) at the facility. The facility does track the temperature of the RTO. The required temperature, set by the first performance test on the RTO, requires the unit to be run at 1625 degrees Fahrenheit. The facility cleans the RTO duct work three times a year because of issues with clogging. If the RTO goes down, the facility must manually shut down the rest of the units, there are no automated controls.

Once the DDGS is cooled and separated by the cyclones, it is directed to a fluid bed cooler. This cooler uses ambient air to cool the DDGS even more and is controlled by a baghouse.

The cooled DDGS gets directed to the DDGS storage building.

DDGS is loaded out mainly by rail at the facility, about 75-80%. The remainder, 20-25%, is loaded out by truck.

The ethanol is loaded out from the one million gallon storage tank mainly by rail, 90%, while only a small percentage is loaded out by truck, 10%. The ethanol load out process is controlled by a flare and the facility tracks and records all flaring events.

We were informed the facility has two natural gas boilers where only natural gas usage is recorded and emissions factors are used to estimate emissions.

The General Manager informed us that the facility is planning to build two new fermentation tanks and a new corn storage tank. No permit application has been submitted for this project. The planned expansion would allow the facility to store an additionally 600,000 bushels of grain.

Finally, the General Manager informed us the facility is in the process of installing a corn oil extraction unit at the facility. The goal is for the unit to be operational by August 2011. The unit will pull the syrup from the 2nd effect tank and run it through a high speed centrifuge, which will separate out the oil. The de-oiled syrup will be send back to the process.

The oil will be transferred to a storage tank and sold as a by-product. The facility believes it can produce about ½ a pound of corn oil per bushel of corn processed. This would equate to 4-5,000 gallons of corn oil produced per day. The facility is using the Natural Resource Group as consultants on this project.

According to the General Manager, the facility has a permit for the corn oil project.

Facility Tour:

After the overview of Green Plains' process, we requested a tour of the facility. The tour began at 9:20 am.

Mr. Wetzel and Ms. Aultman led us on the tour.

Our tour began at the beginning of the process and we walked through all stages of Green Plains' operations. We walked through the grain receiving area and viewed each baghouse. Here there are three lanes for grain receiving in one semi-enclosed building.

On our walk from the grain receiving area to the fermentation process we viewed the new corn oil holding tank, which was under construction.

We walked through the fermentation process and were able to view the slurry tanks, liquefaction tanks, and fermentation tanks.

We then walked through the distillation process, which is also located outside of the main operations building. We were able to see the distillation system.

Our tour consisted of a visit to the facility's control room where we were able to view the main computer system. During the inspection we viewed the temperature of the RTO to be running at 1653 degrees Fahrenheit.

During the tour we requested to climb to the top of the rail load out system. As we were walking to the rail load out location, we noticed a black plume exiting the RTO stack. When we inquired as to the reason for the plume, Ms. Aultman said that the black plume happens occasionally. Mr. Wetzel stated occasionally there is a particulate build-up in the line entering the RTO resulting in an increase of partilculate matter, which the RTO cannot burn off. He left the tour to go speak with the operators of the unit. When he returned he said the operators needed a bit more time to identify the problem, so we continued our tour.

We requested to see the equipment the facility uses for its LDAR program. Green Plains uses a handheld PID device, MiniRae 2000, and calibrates with isobutylene gas.

We then climbed on top of the facility's fermentation tanks. First we climbed on top of fermentation tank #3. When we reached the top of the tank, Mr. Wetzel was already atop and was bolting an open man-way closed. There was a loud whistling sound as the pressure from the

fermentation tank was venting out the man-way. Mr. Gehrig assisted Mr. Wetzel in retrieving the bolts, which were lying around the top of the tank, and re-bolting the lid closed. We also saw evidence of venting from the pressure relief valve (PRV).

We then climbed to the top of fermentation tank #4, but saw no evidence of a leaking PRV or man-way.

Closing Conference:

We conducted the closing conference around 10:50 am. Green Plains did not request notes taken during the inspection be treated as confidential business information. We informed Green Plains that a CAA Section 114 Information Request would be sent to the facility. We concluded by stating that an inspection report would be prepared and the report may be available via the Freedom of Information Act if a copy of the report was desired.

During the conference Mr. Wetzel received confirmation from an operator that the black plume from the RTO was from a cyclone, #2122, being blocked with material. The cyclone needed to be un-clogged. It is unclear if the process was shut-down during the cleaning process.

Document Collected from Inspection:

- 41 photographs and 2 videos of the facility
- Copy of the Daily Environmental Log for July 14, 2011
- Screen Shots of the Facility's Computer System called the DCS for July 15, 2011
- Process Flow Diagram
- Detailed Map of the Plant
- Overview Map of the Plant